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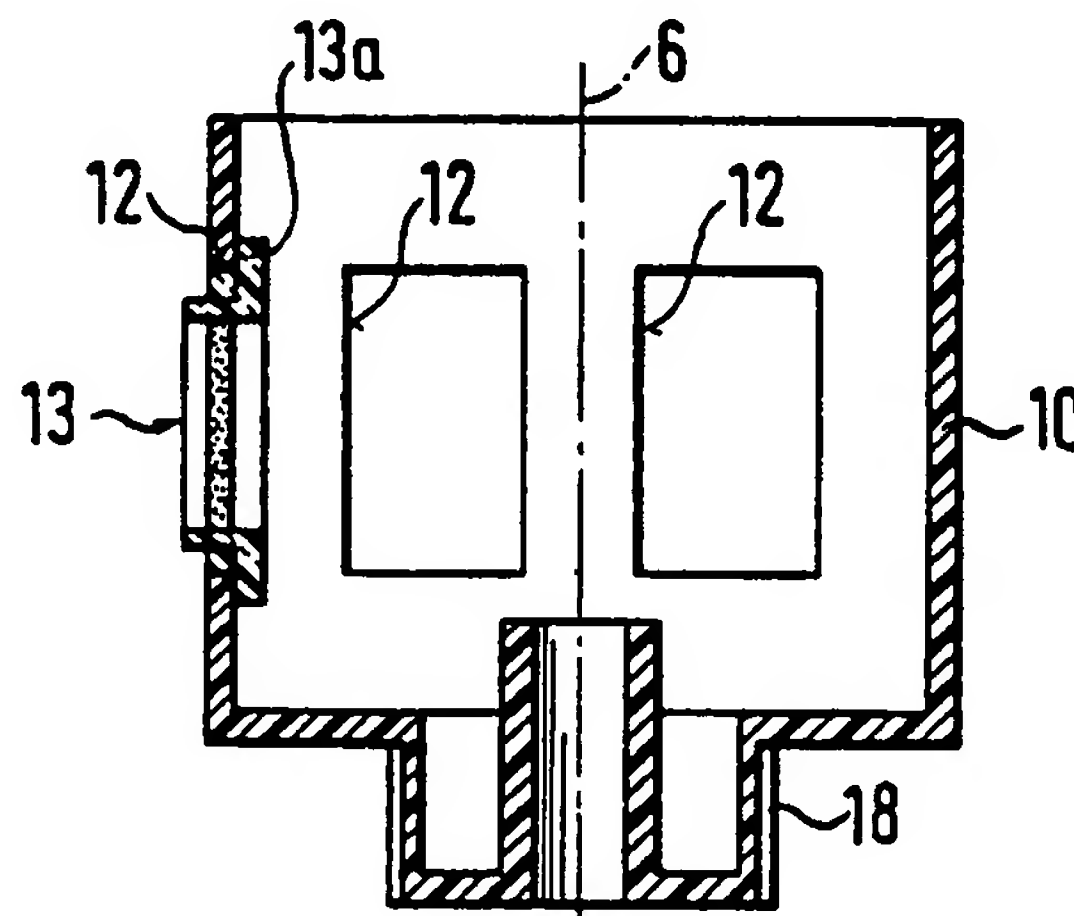
G5C

Selected US specifications from IPC sub-class G09F

(54) Indicating means in a domestic electrical appliance

(57) A household electrical appliance is provided with indicating equipment for optical indication of an operational state of the appliance by means of illuminated indicating symbols which are connected by way of optical conductors 13 with a light source. Each optical conductor is itself constructed in part in the form of the respective symbol, so that light can be transported practically free of loss to the front of the appliance housing and produce intensive luminosity of the symbol. The conductors 13 can be mounted in apertures 12 in a cylinder 10 which is rotatable to dispose selectable ones of the symbols in a viewing position.

FIG. 5



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FIG. 1

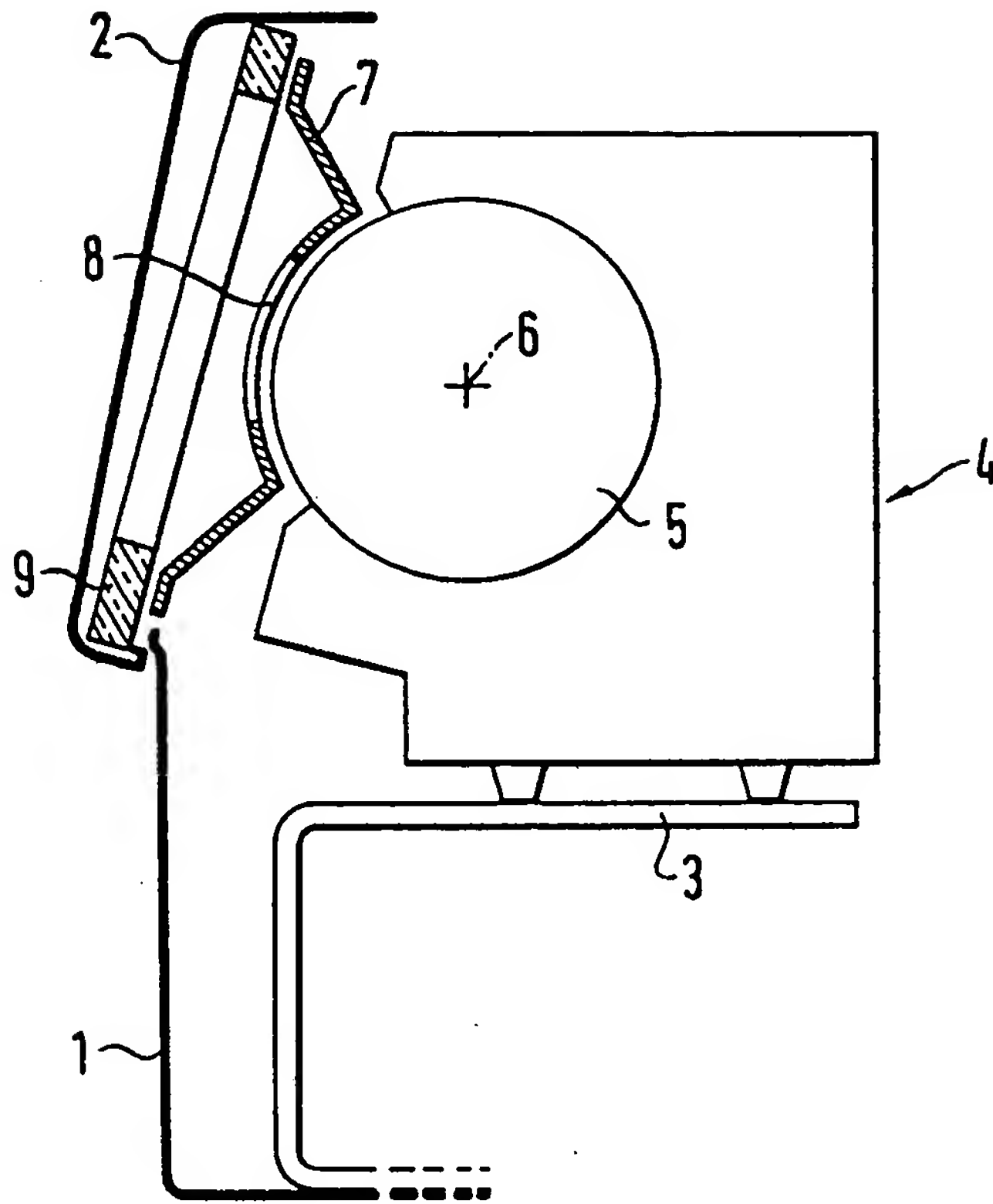


FIG. 2

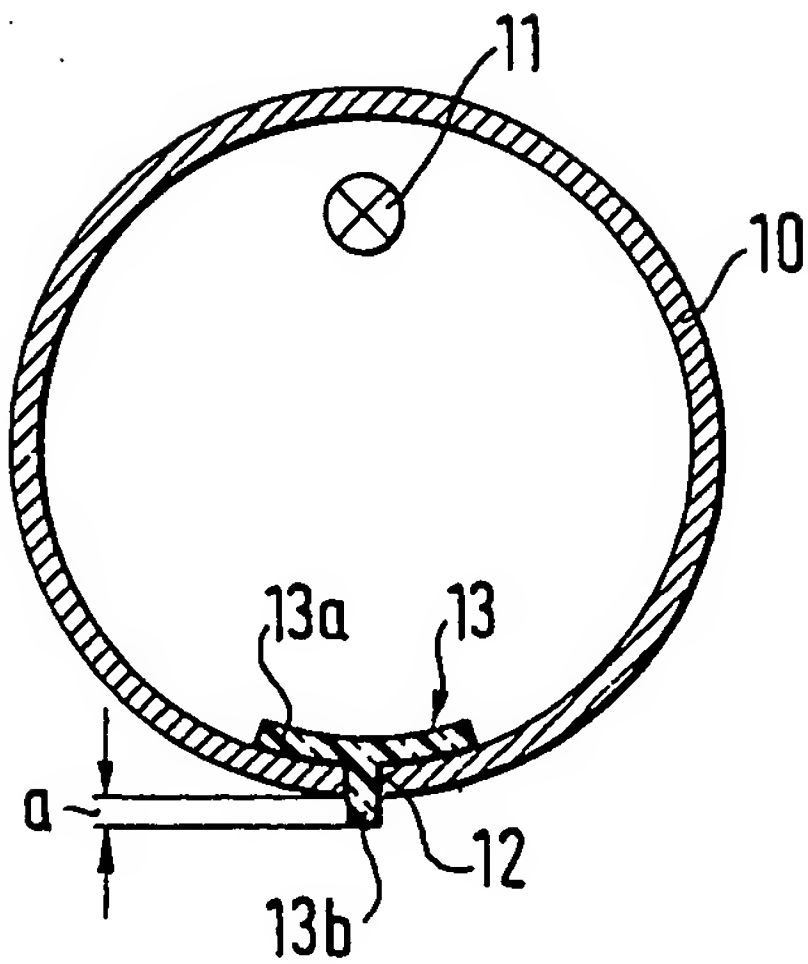


FIG. 3

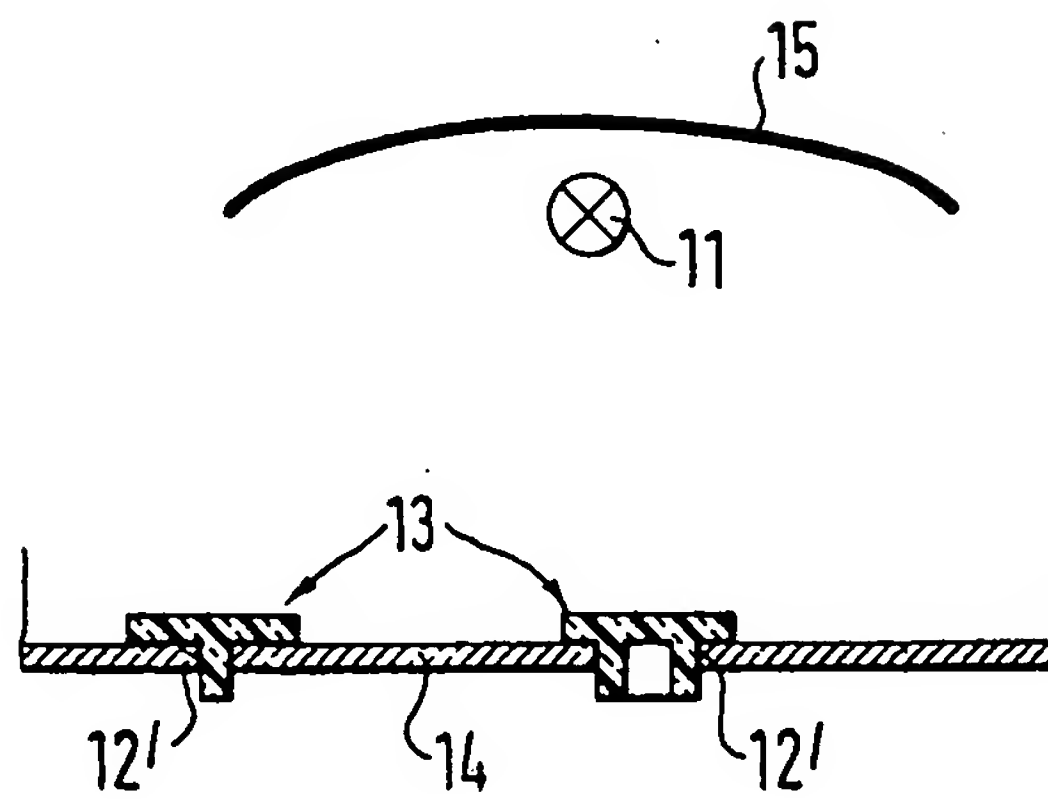


FIG. 4

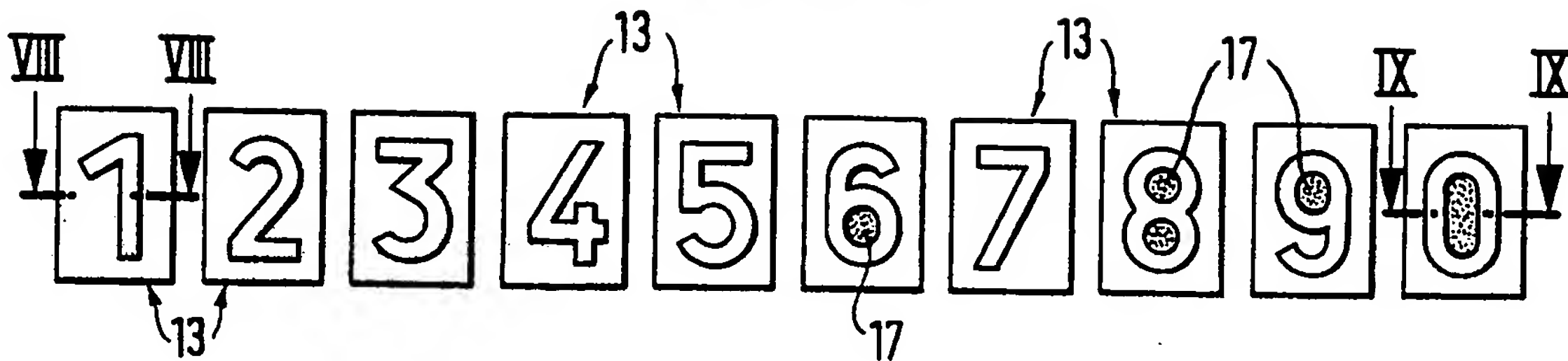


FIG. 5

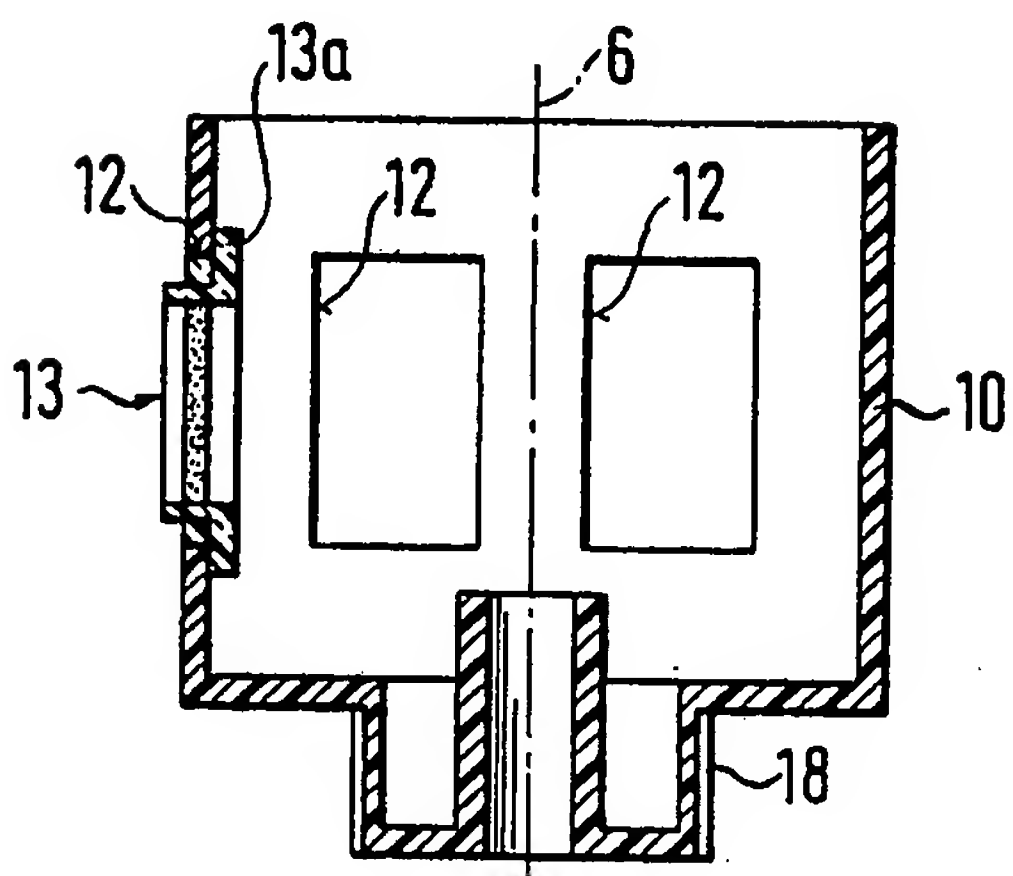


FIG. 11

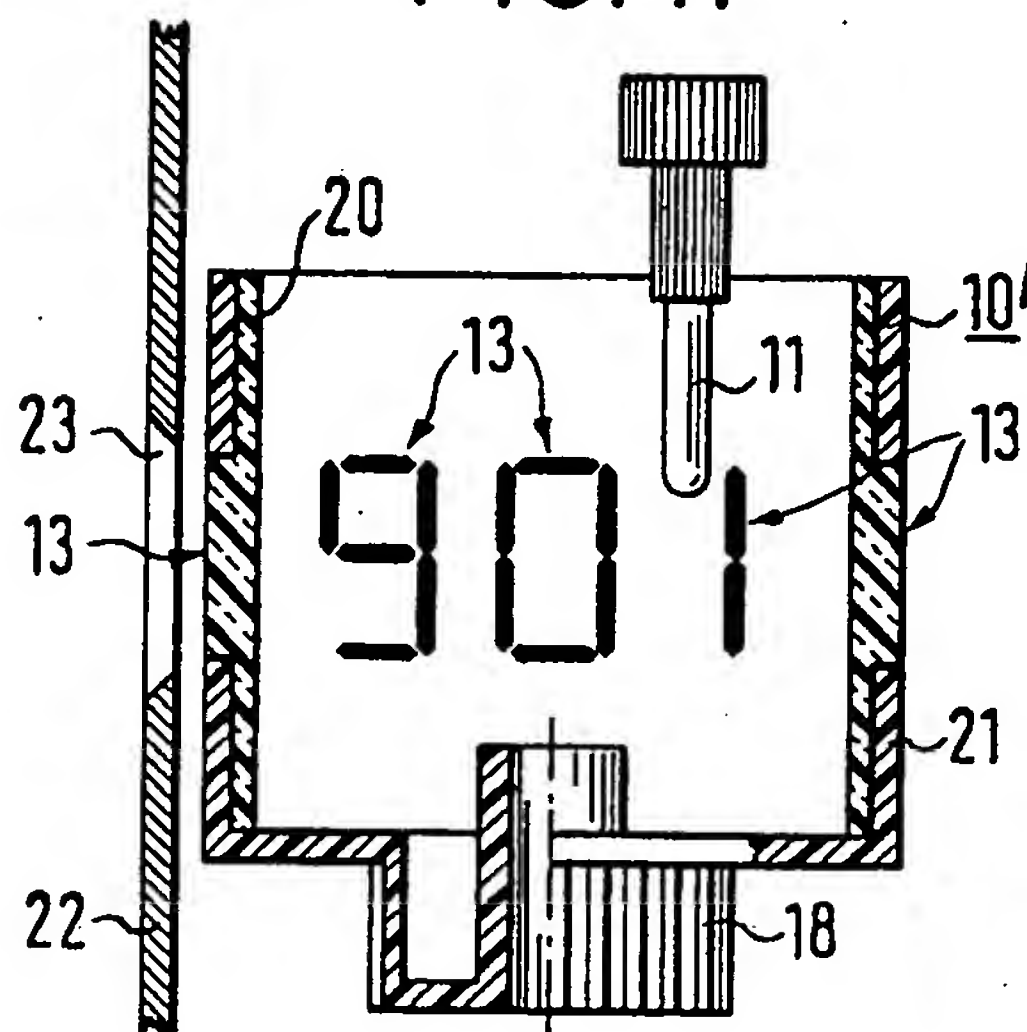


FIG. 6

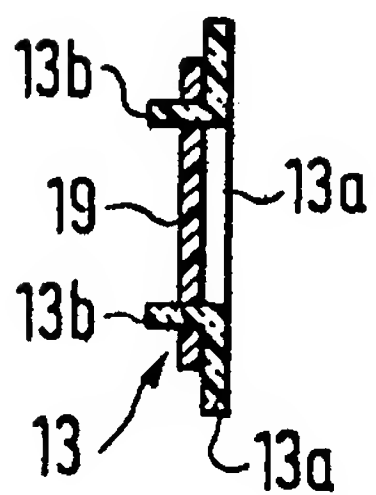


FIG. 7

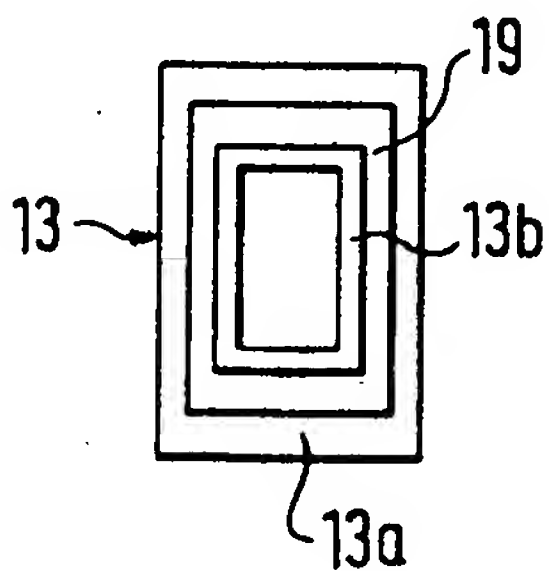


FIG. 9

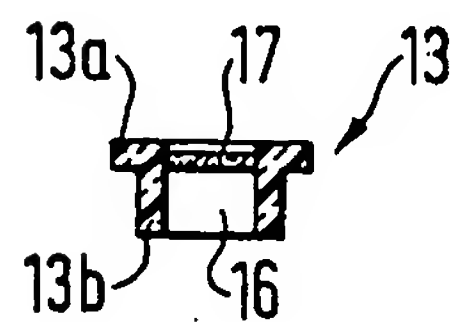


FIG. 8

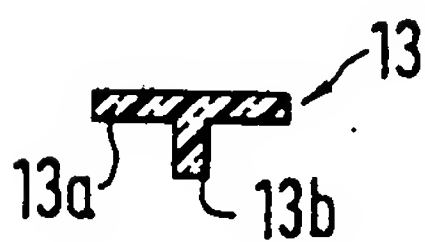
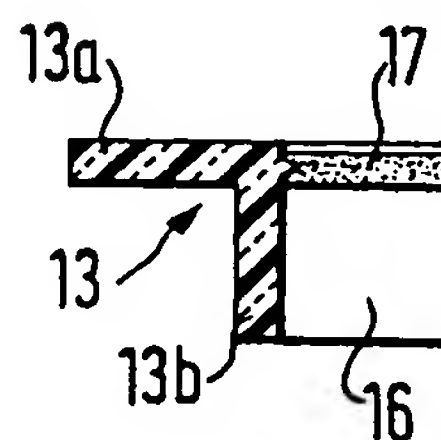


FIG. 10



SPECIFICATION

Indicating means in a domestic electrical appliance

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The present invention relates to a domestic electrical appliance, such as an electrical cooker, washing machine, dishwasher or the like, and has particular reference to indicating means for optical indication of an operational state of the appliance.

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For the illumination of planar surfaces, in particular scales and the like, it is known to use a plate-like body of transparent material (DE-PS 905 448), the body, which is substantially wedge-shaped, being connected to a light source and serving as optical conductor. Starting from this principle, in a known optical switch setting indicator for electrical cookers with rotary switches (DE-AS 12 52 782), several strip-like optical conductors, bent substantially into L-shape, are connected in common at ends thereof to a light source, while they penetrate a front mask of the switch setting indicator at other ends thereof and there form strip-like indicator scales. Through resetting of a functionally associated rotary switch, these optical conductors can be individually screened against the light source so that respectively selected indicator scales illuminate over a large area and signal the switched-on or switched-off state of switching ranges "heating, cooking, roasting". In a variant of this system (DE-GM 17 53 265), a central light source is connected by way of rod-shaped optical conductors with switch setting indicators of individual switches of an electrical cooker. In this case, too, the switched-on or switched-off state of the cooker or the corresponding heating element is signalled through illumination of a round light field or light point, i.e. through lighting-up or extinguishing of an optical signal or through the geometric setting of such a signal within an indicating field the user receives information about the switched-on or switched-off state of the cooker or of the heating element.

By contrast, in so-called light segment indicators or light-emitting diode displays, indicating symbols, for example in the form of numerals or letters or combinations thereof, are optically emphasised by direct lighting-up, wherein the indicating symbols each consist of light strips placed one against the other. In this case, geometrically similar indicating symbols, for example 0 and 8, are often difficult to distinguish apart. Moreover, expensive electrical or electronic circuits are needed for indicating equipment of that kind and such equipment is very sensitive to heat so that expensive heat-insulating or cooling measures must be taken for use in heating appliances, for example electrical cookers.

There thus remains a need for improvement of the recognisability of indicating symbols by

simple constructional measures.

According to the present invention there is provided a domestic electrical appliance provided with indicating means for optical indication of an operational state of the appliance, the indicating means comprising an optical conductor which at least in part has the form of at least one symbol to be indicated, and illuminating means to supply light to the conductor for illumination of the or each symbol.

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Due to the fact that the indicating symbols themselves, for example the numerals or letters, are constructed as optical conductors, the light from a light source arranged behind the appliance front can be transmitted practically free of loss to the indicating panel of the appliance and used not only for the illumination of the indicating symbols, but also for creation of a strong radiation effect which makes itself noticeable in improved recognisability and brilliance of the symbols. Preferably, the conductor comprises a light-conducting and light-collecting material, such as a fluorescent dye with high light intensity and colour fastness. A material of that kind is described in the paper "Praxisinformation", Bayer-Chemiewerkstoffe, in particular page 4. It has proved to be particularly effective in respect of radiation effect when the symbols, in the form of optical conductors, have a certain length, preferably the greatest possible length. Moreover, radiation effect and brilliance can be further increased if the free ends of the symbols project beyond the surface of a mask or the appliance so that lateral radiation of the light rays conducted in the optical conductor takes place.

Embodiments of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a schematic sectional elevation of part of an electrical household appliance,

Figure 2 is a schematic cross-sectional view of one form of indicating equipment usable in the appliance, in a first embodiment of the invention;

Figure 3 is a schematic cross-sectional view of another form of indicating equipment usable in the appliance, in a second embodiment of the invention;

Figure 4 is a view of a set of indicating symbols, constructed as light conductors, for use in such indicating equipment;

Figure 5 is a sectional view of a further form of such indicating equipment;

Figure 6 is a sectional view of a light conductor, representing a symbol, in the equipment of Fig. 5;

Figure 7 is a front view of the conductor of Fig. 6;

Figures 8 and 9 are sectional views of individual conductor-symbols from the set of Fig. 4;

Figure 10 is a detail view, to an enlarged

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scale, of part of the conductor-symbol of Fig. 9; and

Figure 11 is a sectional view of yet another form of such indication equipment.

5 Referring now to the drawings, there is shown in Fig. 1 the upper part of an electrical household appliance, for example an electrical cooker. Arranged within appliance housing 1,2 and above a transverse frame 3 is a switch
10 box 4 with switching equipment (not shown) actuable by way of switch knobs or press elements and with indicating equipment 5. The equipment 5 comprises a cylinder rotatable about an axis 6, on actuation of a rotary
15 knob, into a predetermined setting. Indicating symbols are arranged at the cylinder circumference and, in this setting, are disposed behind a shield 7 with a window 8. A front
20 plate 9, which is transparent at least in the indicating region, is arranged in front of the shield 7.

Fig. 2 shows the indicating equipment in detail. The cylinder 10 serves as a mask and consists of a non-transparent material. A light
25 source, for example a rod-shaped incandescent lamp 11, is arranged in the interior of the cylinder 10. In agreement to a large extent with the embodiment of Figs. 5 to 7, window apertures 12, into which are inserted light
30 conductors 13 in the form of individual components, are provided at the circumference of the cylinder. For the sake of clarity, only one conductor 13 is shown in Fig. 2. As explained more closely in the following, the conductor
35 13 consists of a base portion 13a, of relatively large area and matched to the circular shape of the cylinder 10, and an indicating symbol portion 13b, which extends substantially at a right angle on the base portion, is
40 relatively elongate and projects by an amount a beyond the outer circumference of the cylinder. This component is plugged, and optionally also glued, into the aperture 12. It consists, as also the conductors of the other em-
45 bodiments, of a light-collecting and light-conducting material, preferably with fluorescent dye of high light intensity and colour fastness as a component. Materials of that kind are known by the term LISA. In this case, light
50 emanating from the lamp 11 is collected in large area by the base portion 13a and transported through optical conductor effect to the symbol portion 13b, at the end of which the collected light is delivered outwardly to several
55 sides. Due to the symbol portion 13b projecting by the amount a beyond the circumference of the cylinder 10, a very high brilliance and plasticity is achieved in respect of the light effect.

60 In the embodiment according to Fig. 3, a planar, non-transparent plate 14 is provided as mask and again has window apertures 12', into which conductors 13 constructed as indi-

the light source 11 in the case of the embodiment of Fig. 2 in that it is, for example, provided with an appropriate reflecting coating, an actual reflector 15 is associated with the
70 light source 11 in the embodiment of Fig. 3.

Fig. 4 shows conductors 13, constructed as individual components, with symbol portions in the form of numerals 1 to 0. As clarified by Fig. 8, each conductor 13 consists of the
75 base portion 13a and the elongate, somewhat rod-like indicating symbol portion 13b. Both portions consist of the mentioned homogeneous material and have good properties for the collection and conduction of light. The
80 structure of the conductor is represented in Figs. 9 and 10 by reference to the numeral 0, wherein this numeral possesses an enclosed area 16. To improve the recognisability and brilliance, a non-transparent insert 17 or injection-moulded part is arranged in the area 16 in
85 a such a manner that the symbol portion 13b again projects beyond the insert 17. The same applies at least to the numerals 6, 8 and 9.

90 Fig. 5 shows in sectional illustration a part of an indicating cylinder 10 such as that of Fig. 2. Apparent in this case are the apertures 12, which are machined into the circumference of the cylinder and into which the different
95 conductors 13 are inserted. The cylinder 10 at at least one end face possesses a drive take-off pinion 18, by way of which the cylinder can be rotated about the axis 6 by means of, for example, the afore-mentioned knob. As is
100 evident, the base portion 13a is bent over in the manner of a skid so that its middle part lies in the aperture 12 and its thinner outer part bears against the inside wall of the cylinder 10. These individual components are inter-
105 changeable amongst one another. As clarified by reference to the Fig. 6, the substantially planar surface of the base portion 13a can be provided, for example moulded, with a non-transparent coating 19 (Figs. 6 and 7). As
110 already mentioned, these individual components are interchangeable as desired and are producible in different colours.

In the embodiment according to Fig. 11, the conductors 13 are integral components of a
115 common carrier 20, which is cylinder-like in the illustrated embodiment and which consists of a light-collecting and light-conducting material of the afore-mentioned kind. The carrier 20 is provided on its outer circumference with
120 conductors 13 arranged as raised elements and is surrounded, for example by being moulded around, by a non-transparent outer ring which represents a mask 21 tightly surrounding but not covering the symbol portions
125 of the conductors. It can of course be provided in this embodiment that the symbol portions of the conductors project beyond the outer surface of the mask 21. The mask 21 at the same time has a drive take-off pinion

interior of the cylinder 10' formed in this manner. The cylinder 10' is arranged behind a shield 22 with a viewing window 23. In this embodiment, the inner ring or the carrier 20 again consists of a light-collecting and light-conducting material. The advantage results in this case that the surface of this carrier and thereby of the base portions of all conductors 13 is large and much light can be collected and conducted outwardly in this manner.

The embodiments of Figs. 1 and 11 further differ from each other in that the axis 6 of the cylinder extends horizontally in Fig. 1 and vertically in Fig. 11.

CLAIMS

1. A domestic electrical appliance provided with indicating means for optical indication of an operational state of the appliance, the indicating means comprising an optical conductor which at least in part has the form of at least one symbol to be indicated, and illuminating means to supply light to the conductor for illumination of the or each symbol.

2. An appliance as claimed in claim 1, wherein the conductor comprises a light-collecting and light-conducting material.

3. An appliance as claimed in claim 2, wherein the material comprises a fluorescent dye with high light intensity and colour fastness.

4. An appliance as claimed in any one of the preceding claims, wherein the conductor is arranged at an at least substantially light-impermeable masking element.

5. An appliance as claimed in claim 4, wherein the masking element is a substantially planar plate.

6. An appliance as claimed in claim 5, wherein the plate is an indicating panel of the appliance.

7. An appliance as claimed in claim 4, wherein the masking element is cylindrical.

8. An appliance as claimed in any one of claims 4 to 6, comprising a plurality of such conductors arranged at the masking element.

9. An appliance as claimed in claim 8, wherein each of the conductors comprises a base portion and a further portion which projects from the base portion and defines the respective symbol or symbols.

10. An appliance as claimed in claim 9, wherein the further portion projects from the base portion at a right angle.

11. An appliance as claimed in either claim 9 or claim 10, wherein the base portion is provided at one side thereof with an at least partially light-impermeable coating.

12. An appliance as claimed in any one of claims 1 to 3, comprising a plurality of such conductors arranged at a common planar or cylindrical carrier of light-conducting material.

13. An appliance as claimed in claim 12, wherein the conductors are formed integrally with the carrier.

14. An appliance as claimed in either claim 12 or claim 13, comprising an at least partially light-impermeable masking element covering a surface of the carrier apart from the symbols.

15. An appliance as claimed in claim 14, wherein the masking element is provided by a spray coating on the carrier.

16. An appliance as claimed in any one of claims 4 to 11, 14 and 15, wherein the or each conductor is so arranged that a portion thereof defining the respective symbol or symbols projects beyond a surface of the masking element.

17. An appliance as claimed in any one of preceding claims, wherein the or at least one such conductor defines a symbol enclosing an area, the conductor being provided in said area with a light-impermeable member.

18. An appliance as claimed in either claim 9 or claim 13, wherein the conductors are optically connected by their base portions or the carrier, as the case may be, over a large area to the illuminating means.

19. An appliance as claimed in claim 1, comprising a plurality of such conductors arranged at a cylindrical masking element or cylindrical carrier of light-conducting material, the illuminating means being arranged in the interior of the masking element or carrier.

20. An appliance as claimed in claim 1, comprising a plurality of such conductors arranged at a cylindrical masking element or cylindrical carrier of light-conducting material, the masking element or carrier being provided with integral drive coupling means.

21. An appliance as claimed in claim 20, the drive coupling means comprising a pinion.

22. A domestic electrical appliance provided with indicating means substantially as hereinbefore described with reference to Figs. 1 and 2 of the accompanying drawings.

23. A domestic electrical appliance provided with indicating means substantially as hereinbefore described with reference to Fig. 3 of the accompanying drawings.

24. A domestic electrical appliance provided with indicating means substantially as hereinbefore described with reference to Fig. 4 of the accompanying drawings.

25. A domestic electrical appliance provided with indicating means substantially as hereinbefore described with reference to Figs. 5 to 7 of the accompanying drawings.

26. A domestic electrical appliance provided with indicating means substantially as hereinbefore described with reference to Figs. 8 to 10 of the accompanying drawings.

27. A domestic electrical appliance provided with indicating means substantially as hereinbefore described with reference to Fig. 11 of the accompanying drawings.

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